

ABSTRACT

Methods of manufacturing semiconductor devices are disclosed. In an illustrated method, a contact hole in an insulating layer is filled with a copper layer and the copper layer is planarized. During the planarizing, a CuO layer is parasitically formed on the surface of the copper layer. The CuO layer is removed by plasma processing using ammonia or nitrogen. A conductive CuN layer is formed on the surface of the copper layer. Stability of the removal process of CuO layer is secured.